

REMARKS

Reconsideration of the pending application is respectfully requested on the basis of the following particulars.

1. Interview of September 19, 2007

The applicants are appreciative of the opportunity to discuss the pending application with the examiner on September 19, 2007. During the interview, the subject matter of the pending claims, in particular the proposed amendment to the claims, and U.S. patent nos. 6,064,521 (*Burke*) and 6,076,933 (*DiLoreto*) were discussed. Additionally, a sample of a double-sided image screen having a thickness of 75  $\mu\text{m}$ , an index of refraction of 2.5, and a content corresponding to a weight ratio of 50,000 ppm was shown.

The applicant presented arguments that the proposed combination of the *Burke* and *DiLoreto* patents fails to disclose or suggest the specific ranges of content of the light-refracting material and index of refraction of the light-refracting material, and the thickness of the double-sided image film screen, such that the thickness of the film screen, index of refraction of the light-refracting material, and content of the light-refracting material mutually interact such that an image projected from a single projector is dividedly displayed on front and rear surfaces of the film screen, to enable simultaneous display of the image at the front and rear surfaces of the film screen, as required in proposed amended claim 1.

The examiner agreed that the proposed amendment to the claims appears to overcome the prior art of record.

2. In the specification

The specification is amended, as shown in the foregoing AMENDMENT TO THE SPECIFICATION, to provide clarification and correct minor informalities. It is respectfully submitted that no new matter is added, as the changes simply provide clarification and correct minor informalities.

Entry of the AMENDMENT TO THE SPECIFICATION is respectfully requested in the next Office communication.

3. In the claims

As shown in the foregoing AMENDMENT TO THE CLAIMS, the claims have been amended to more clearly point out the subject matter for which protection is sought.

A. Claims amendments

Claim 1 is amended to include elements of original claims 1 and 2, to recite the range of the index of refraction of the light-refracting material to be 2.5-3.0, and to further recite that the light-refracting material is contained in or deposited on the transparent material at each side of the film screen. It is respectfully submitted that no new matter is added since the amendment merely merges the subject matter of originally presented claims and support for the amendment is found at least in Figs. 4(b), 6, and 13, and on page 6, lines 19-35, page 7, lines 1-7, 24-28, page 13, lines 27-29, and the abstract of the pending disclosure as originally filed.

In particular, the refractivity of the light-refracting material is recited as being 1.4 or more, with specific recitations of the refractivity being 2.5 or 3. Accordingly, the range of the index of refraction of the light-refracting material being 2.5 to 3.0 is fully supported by the disclosure as originally filed.

Claim 2 is amended so as to be consistent with amended claim 1.

Claims 3-6 and 10 are left unchanged.

Claim 7 is currently canceled and claims 8 and 9 remain canceled.

Entry of the AMENDMENT TO THE CLAIMS is respectfully requested in the next Office communication.

B. Claim objections

Reconsideration and removal of the objection to claim 1 is respectfully requested on the basis that the correction to the claim suggested in the Office action on page 2 has been made.

Accordingly, removal of the objection to claim 1 is respectfully requested.

4. Rejection of claims 1 and 10 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 6,064,521 (*Burke*) in view of U.S. patent no. 6,076,933 (*DiLoreto*)

Reconsideration of this rejection is respectfully requested on the basis that the rejection fails to establish a *prima facie* case of obviousness with respect to amended claim 1, from which the remaining claims depend, as was discussed and agreed during the interview of September 19, 2007.

In review, the embodiment of amended claim 1 requires a double-sided image film screen formed of a transparent material and a light-refracting material contained in or deposited on the transparent material at each side of the image film screen. The light-refracting material has an index of refraction of 2.5 to 3.0 and a content ranging from a weight ratio of 800ppm to a weight ratio of 90,000ppm. The thickness of the screen, index of refraction of the light-refracting material, and the content of the light refracting material all mutually interact to allow an image projected from a single projector to be dividedly displayed on the front and rear surfaces of the film screen to allow simultaneous display of the image at the front and rear surfaces of the film screen while eliminating a hot spot.

When the content of the light-refracting material is less than the lower limit defined in amended claim 1, the light of the projected image passes through the film screen in an excessive amount. In this case, only the display of the image at the rear surface of the film screen is possible. Accordingly, it is impossible to enable simultaneous display of the image at the front and rear surfaces of the film screen.

On the other hand, when the content of the light-refracting material is greater

than the upper limit defined in amended claim 1, the light of the projected image cannot pass through the rear surface of the film screen. In this case, only the display of the image at the front surface of the film screen is possible. In other words, the display of the image at the rear surface of the film screen is impossible. Accordingly, it is impossible to enable simultaneous display of the image at the front and rear surfaces of the film screen.

When the screen is excessively thin, the content of the light-refracting material is excessively small due to the excessively-reduced thickness of the film screen. In this case, the light of the projected image passes through the film screen in an excessive amount such that a substantially-half amount of the light emerges from the film screen. Accordingly, only the display of the image at the rear surface of the film screen is possible. Furthermore, a hot spot phenomenon may occur.

On the other hand, when the screen is excessively thick, the content of the light-refracting material is excessively large due to the excessively-increased thickness of the film screen. In this case, the light of the image refracted toward the rear surface of the film screen is shielded. For this reason, the display of the image at the rear surface of the film screen is impossible. In this case, accordingly, only the display of the image at the front surface of the film screen is possible.

Meanwhile, when the refractivity of the light-refracting material is reduced, the content of the light-refracting material should be increased.

Thus, the simultaneous display of the image at the front and rear surfaces of the film screen is enabled only when both the refractivity of the light-refracting material and the content of the light-refracting material mutually interact, together with a given thickness of the film screen.

In contrast to the claimed embodiment, the proposed combination of the *Burke* and *DiLoreto* patents fails to disclose a double-sided image film screen having the recited characteristics suitable to allow an image projected from a single projector to be dividedly displayed on the front and rear surfaces of the film screen to allow

simultaneous display of the image at the front and rear surfaces of the film screen while eliminating a hot spot.

In particular, the *Burke* patent discloses systems and methods for displaying images of entire scenes in apparent three dimensions (abstract; col. 1, lines 6-9). The *Burke* patent describes a design for a screen that utilizes a transparent substrate, a polarizing layer, and a partially transparent and reflective bead layer (col. 16, lines 12-14). The bead layer is embedded in a transparent base whose index of refraction is different from that of the beads (col. 16, lines 16-17). The *Burke* patent is silent, however, on the actual values of the index of refraction for both the bead layer and the transparent base.

Thus, the rejection turns to the *DiLoreto* patent for teachings on the index of refraction for such beads. The *DiLoreto* patent discloses light filters having an array of light transmissive beads to provide optimized control of optical properties such as gain (abstract). Examples given for the indices of refraction of the beads are 1.5, 1.7, 1.9, with available materials having indices of refraction of between 1.4 and 2.3 (col. 5, lines 52-53; col. 16, lines 18-23).

Thus, the proposed combination of the *Burke* and *DiLoreto* patents may have beads with an index of refraction in the range of 1.4 to 2.3. However, this range is outside the range of 2.5 to 3.0 for the index of refraction of the light-refracting material of amended claim 1. Thus, the proposed combination of the *Burke* and *DiLoreto* patents fails to disclose every element of amended claim 1.

Further, a skilled artisan would not have been motivated to increase the range of 1.4 to 2.3 of the index of refraction of the beads of the combination of the *Burke* and *DiLoreto* patents to fall within the range of 2.5 to 3.0 of the index of refraction of the light-refracting material, as required by amended claim 1.

Specifically, the *DiLoreto* patent teaches that the gain of the filter *decreases* with an increasing index of refraction of the beads (col. 5, lines 53-56). Since one goal of the *DiLoreto* patent is to optimize the gain of a filter, as previously discussed, a skilled artisan would not have been motivated to increase the index of refraction of

the beads of the *DiLoreto* patent, since such an increase in the index of refraction of the beads would decrease the gain of the filter, and thus destroy one of the main features of the filters disclosed in the *DiLoreto* patent.

Further, returning to the *Burke* patent, each embodiment of the *Burke* patent requires a polarizing layer in order to achieve the apparent three dimensional image (col. 25, lines 65-67; col. 26, line 66 through col. 27, line 11). In particular, the tenth design includes bead layer and a polarizing layer (col. 21, lines 8-31). While the tenth design is disclosed as a screen that allows an image to be seen from either side of the screen, the image is not “dividedly or equally displayed on the front and rear sides of the screen,” as required by amended claim 1. This can be seen with particular reference to Fig. 24, which shows polarizing layer absorbing wave 459. Thus, since some of the waves are absorbed by the polarizing layer, the image on the rear side of the screen will not be as bright as the image on the front side (the side towards the projector), and thus, the image will not be “dividedly” displayed on the front and rear sides of the screen as required by amended claim 1.

Additionally, a skilled artisan would not have been motivated to add the filter of the *DiLoreto* patent to the screen of the *Burke* patent, since the filter of the *DiLoreto* patent would further decrease the amount of light passing through the screen of the *Burke* patent, and would therefore even further reduce the ability of the screen of the *Burke* patent to allow the image to be seen from the rear surface of the screen (the side away from the projector).

Further still, neither the *Burke* nor the *DiLoreto* patent disclose the content of the beads being in the range of a weight ratio of 800ppm to a weight ratio of 90,000ppm, as required for the light-refracting material of amended claim 1. As required by amended claim 1, the content of the light refracting material, the thickness of the film screen, and the index of refraction of the light refracting material all mutually interact to allow an image projected from a single projector to be dividedly displayed on the front and rear surfaces of the film screen to allow simultaneous

display of the image at the front and rear surfaces of the film screen while eliminating a hot spot.

Since the proposed combination of the *Burke* and *DiLoreto* patents fails to meet the requirement that the index of refraction of the light-refracting material is in the range of 2.5 to 3.0, and inherently fails to disclose equally dividing an image for display upon front and rear surfaces of a screen, it would not have been obvious to a skilled artisan to provide the content of the light-refracting material in the claimed range. Due to the necessary polarizing layer of the *Burke* patent, and the limit on the index of refraction of 2.3 of the beads of the *DiLoreto* patent there is no optimum level of the content of the beads for the proposed combination of the *Burke* and *DiLoreto* patents that would produce the result of amended claim 1 that an image projected from a single projector will be dividedly displayed on the front and rear surfaces of the film screen to allow simultaneous display of the image at the front and rear surfaces of the film screen while eliminating a hot spot, and therefore, there is no reasonable expectation that the proposed combination of the *Burke* and *DiLoreto* patents will successfully describe the embodiment of amended claim 1.

Thus, it would not have been obvious to skilled artisan to provide the content level of the light-refracting material as claimed, since there is no suggestion that would have motivated a skilled artisan to utilize the specific range for the content level of the light-refracting material as claimed.

In view of the above comments, and as agreed during the interview of September 19, 2007, since the proposed combination of the *Burke* and *DiLoreto* patents fails to disclose the specific ranges for the index of refraction and content of the light-refracting material, since there is no suggestion that would have motivated a skilled artisan to provide the specific ranges for the index of refraction and content of the light-refracting material, and since there is no reasonable expectation that the proposed combination of the *Burke* and *DiLoreto* patents will successfully describe the embodiment of amended claim 1, a *prima facie* case of obviousness cannot be maintained, and withdrawal of this rejection is respectfully requested.

The remaining claims depend from claim 1, and are therefore patentable as containing all of the recited elements of claim 1, as well as for their respective recited features.

5. Rejection of claim 2 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 6,064,521 (*Burke*) in view of U.S. patent no. 6,076,933 (*DiLoreto*) and further in view of U.S. patent no. 5,456,967 (*Nezu*)

Reconsideration of this rejection is respectfully requested, in view of the discussion above, on the basis that the *Nezu* patent fails to provide for the deficiencies of the *Burke* and *DiLoreto* patents pointed out in detail above.

Accordingly, withdrawal of this rejection is respectfully requested.

6. Rejection of claims 3 and 4 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 6,064,521 (*Burke*) in view of U.S. patent no. 6,076,933 (*DiLoreto*) in view of U.S. patent no. 5,456,967 (*Nezu*) and further in view of U.S. patent no. 5,274,499 (*Shopp*)

Reconsideration of this rejection is respectfully requested, in view of the discussion above, on the basis that the *Shopp* patent fails to provide for the deficiencies of the *Burke* and *DiLoreto* patents pointed out in detail above.

Accordingly, withdrawal of this rejection is respectfully requested.

7. Rejection of claims 5 and 7 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 6,064,521 (*Burke*) in view of U.S. patent no. 6,076,933 (*DiLoreto*) in view of U.S. patent no. 5,456,967 (*Nezu*) and further in view of U.S. publication no. 2003/0107803 (*Tanaka*)

Reconsideration of this rejection is respectfully requested, in view of the discussion above and the cancellation of claim 7, on the basis that the *Tanaka* publication fails to provide for the deficiencies of the *Burke* and *DiLoreto* patents pointed out in detail above.

Accordingly, withdrawal of this rejection is respectfully requested.



8. Rejection of claim 6 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 6,064,521 (*Burke*) in view of U.S. patent no. 6,076,933 (*DiLoreto*) in view of U.S. patent no. 5,456,967 (*Nezu*) and further in view of U.S. publication no. 2003/0163367 (*Piepel*)

Reconsideration of this rejection is respectfully requested, in view of the discussion above, on the basis that the *Piepel* publication fails to provide for the deficiencies of the *Burke* and *DiLoreto* patents pointed out in detail above.

Accordingly, withdrawal of this rejection is respectfully requested.

9. Conclusion

As a result of the amendment to the claims, and further in view of the foregoing remarks, it is respectfully submitted that the application is in condition for allowance. Accordingly, it is respectfully requested that every pending claim in the present application be allowed and the application be passed to issue.

If any issues remain that may be resolved by a telephone or facsimile communication with the applicant's attorney, the examiner is invited to contact the undersigned at the numbers shown below.

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Respectfully submitted,

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